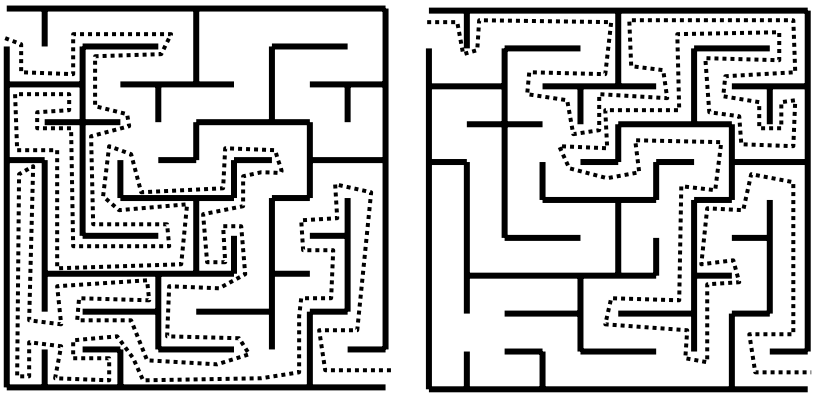
Mark Scheme 4771
June 2005

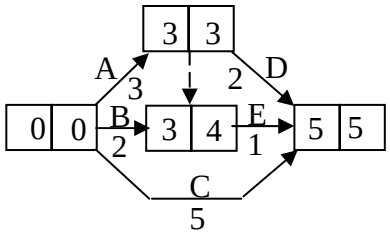
1.

(i)	Any connected tree.	M1 A1
	12 connections	B1
(ii)	14 connections	B1
(iii)	e.g. He might be able to save cable by using it. e.g. To avoid overloading.	B1
(iv)	Yes. A minimum connector is a tree. This gives the min number of arcs (n–1). This gives the minimum no of connections (2(n–1)).	B1 B1 B1

2.

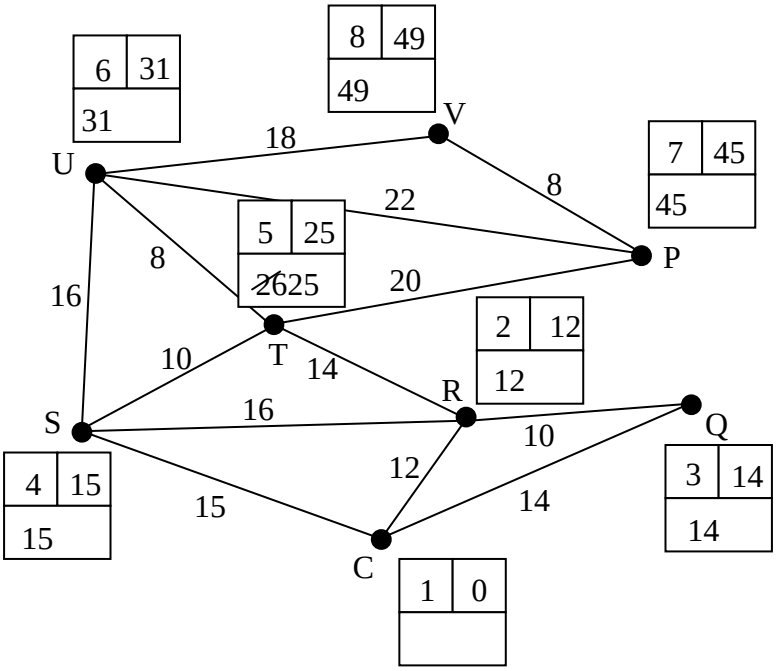
(i)	Janet John 	M1 A1 A1
(ii)	Yes Janet's route traces west and south walls plus "attachments". John's route traces north and east walls plus "attachments". − or equivalent (Any "islands" are irrelevant.)	M1 A1 B1
(iii)	Yes	B1
(iv)	Yes All avenues covered by forward and backward pass (i.e. by John's original route + Janet's route).	B1

3.

(i)		M1 A1 B1 B1
(ii)	Critical − A, D and C	B1
(iii)	Total float for B = 2 Independent float for B = 1 Total float for E = 1 Independent float for E = 0	B1 both total floats A1 B's independent A1 E's independent

4.

(i)



B1 starting at C

M1 Dijkstra
A1 labels
A1 order of labelling
A1 working values

P	Q	R	S	T	U	V
45	14	12	15	25	31	49

B1

P T S C
V U S C

B1
B1

(ii) PV ST CR RT UV Length = 80
TU QR

M1
A1 first 5
A1 last 2
B1 length

(iii) CP reduced to 26
CV reduced to 34

B1 (both and no more)

(iv) UV replaced by PQ New length = 74

B1

(v) Q
Semi-Eulerian. (Order of P changed from 3 to 4, but order of Q changed from 2 to 3 − so still 2 odd vertices.)
or Cross the bridge and proceed as before
or A valid route

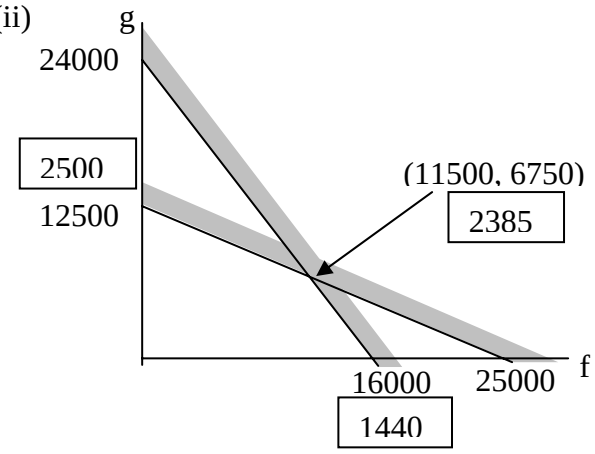
M1

A1

5.

(i)	eg. 00–19 → 0 20–49 → 1 50–69 → 2 70–84 → 3 85–99 → 4	 M1 sca at proportions A1
(ii)	1, 0, 2, 3, 1, 3, 4, 3, 0, 0	M1 A1
(iii)	eg. 00–15 → 0 16–39 → 1 40–63 → 2 64–95 → 3 96–99 → ignore	 M1 missing some A1 times
(iv)	1, 0, 1, 0, 1, 1, 3, 3, 2, 2	B1 one ignored B1 rest
(v)	Day 0 1 2 3 4 5 6 7 8 9 10 Stock 3 3 3 2 0 0 0 0 0 2 4 Disptd 0 0 0 0 1 0 2 1 0 0 0	M1 A1 A1
(vi)	Day 0 1 2 3 4 5 6 7 8 9 10 Stock 3 3 3 2 0 1 0 0 1 3 5 Disptd 0 0 0 0 0 0 0 1 0 0 0	M1 using both ret dists A1 A1
	Only 1 disappointed under new policy against 4 under old policy. Not definitely, but pretty convincingly.	B1 B1

6.

(i)	Let f be the number of litres of Flowerbase produced Let g be the number of litres of Growmuch produced	B1
	Max 9f + 20g s.t. 0.75f + 0.5g ≤ 12000 f + 2g ≤ 25000	M1 A1 M1 A1 A1
(ii)		B1 labels + scales B1 B1 lines B1 shading
	Max profit = £2500 by producing 12500 litres of Growmuch	M1 A1
(iii)	No effect	B1
(iv)	No effect The profit on Flowerbase will be reduced by more than that suffered by Growmuch, since it uses more fibre. The objective gradient will thus increase from −9/20, making it even less attractive to produce any Flowerbase.	M1 A1
(v)	£3000	B1